

NMO

USER GUIDE

SAFETY INSTRUCTIONS

NOTE: Read the entire information below and operating instructions before using NAO to avoid injury. Additional user information may be available on the DVD delivered with NAO under the documentation folder and on the NAO User Guide.

WARNING: Follow these safety guidelines to help ensure your own personal safety and to help protect your NAO and working environment from hazard and potential damage.

GENERAL SAFETY

NAO is not a toy intended for children under 14 years old. NAO can be used in interaction with a child under the supervision of an adult who has read and understood these instructions.

All materials for fastening or packing purposes are not part of NAO and should be discarded for children's safety.

To prevent the spread of fire, keep candles or other open flames away from this product at all times.

CAUTION: Before starting to use your NAO and its associated software, make sure you read and understood the "NAO User Guide" and the documentation provided on the DVD under the "Documentation" folder.

HANDLING NAO:

Take care not to spill any food or liquid on NAO. In case NAO gets wet, unplug all cables, turn before cleaning, and allow it to dry thoroughly before turning it on again. Do not attempt to dry NAO with an external heat source, such as a microwave oven or hair dryer.

- Ensure that nothing rests on your NAO's cables and that the cables are not located where they can be stepped on or tripped over.
- Ensure that all cables are connected to the appropriate connectors.
- Keep your NAO away from radiators and heat sources.
- Keep your NAO away from extremely hot or cold temperatures to ensure that it is used within 15°C and 30°C.
- Do not touch the software protection of NAO, especially do not remove the DCM (Device Communication Manager).
- Do not drop, disassemble, open, crush, bend, deform, puncture, shred, microwave, incinerate or paint your NAO. Doing so can cause fire, electric shock or damages to your NAO.
- Do not use your NAO in a wet environment, for example, in rain or near a bath tub, sink, or swimming pool or in a wet basement.
- Do not spill food or liquids on your NAO.
- Do not use AC powered NAO during an electrical storm. Battery powered NAOs may be used if all cables have been disconnected.
- NAO should not be charge while lying on its back or while walking. This could lead to potential damages of the cable, plug or connector of the battery.
- The provided Li-ion Battery pack is fully protected for ALDEBARAN's NAO use. All other use is strictly forbidden.
- The transport of lithium batteries is regulated by the IATA convention (International Air Transport Association) and it involves that batteries must be in carry-on baggage.

- Before you clean your NAO, disconnect it from the electrical outlet. Clean your NAO with a soft cloth dampened with water. Do not use liquids or aerosol cleaners, as they may contain flammable substances.
- Leave a free space with a radius of at least 2 feet (0.6 meter) around NAO to avoid obstacles.
- Make sure the floor surface is hard, flat and dry.
- Do not make your NAO walk on thick carpets or rugs, mattresses, clothes.
- Protect your NAO from falls: falling from a table or a high plane may damage your NAO.
- Do not try to make your NAO jump, it could fall.
- Do not exert strong forces on your NAO.
- Do not block the sensors or introduce foreign objects into its body.
- Do not use your NAO outdoor.
- The springs of the shoulder joints may be visible: do not touch them, you could hurt yourself.
- Do not use your NAO in charge: it could be disconnected.
- Do not use your NAO with the Ethernet cable plugged in.

NOTE: When you make your NAO walking with the battery cable plugged in, your NAO may fall.

CAUTION: Avoid carrying and touching your NAO when it is moving, walking or getting up, you could be severely pinched. The joints of NAO can be extremely strong.

To release the stiffness of NAO in case of emergency, press twice on its chest button.

For emergency shut down, press and hold NAO's chest button 8 seconds.

- Use care when touching its tactile sensor or bumpers, to not be pinched or make NAO fall.
- Tactile sensor is like antenna : it react to frequency.
- Hold your NAO with both hands by the waist/torso.
- Do not pull NAO by the arms, legs or head.
- Do not open any part of NAO.
- The joints of NAO can get too hot in case of intensive use, especially with the motors enslaved.
- Your NAO is sensible to electrostatic discharge (ESD).

If your NAO does not operate normally - in particular, if you detect any unusual sounds or smells coming from it - unplug it and turn it off immediately and contact ALDEBARAN Robotics' support desk.

REPAIRING YOUR NAO

Do not attempt to repair or modify NAO yourself, except as explained in the Documentation provided on the DVD by ALDEBARAN Robotics. Always follow installation and service instructions closely.

NOTE

Safety and User guide are subject to change without notice. Please refer to our website www.aldebaran-robotics.com to find the latest version of the Safety and User Guide.

Welcome to the NAO Community!

This guide will help you to get started with your NAO.

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WHAT'S IN THE BOX

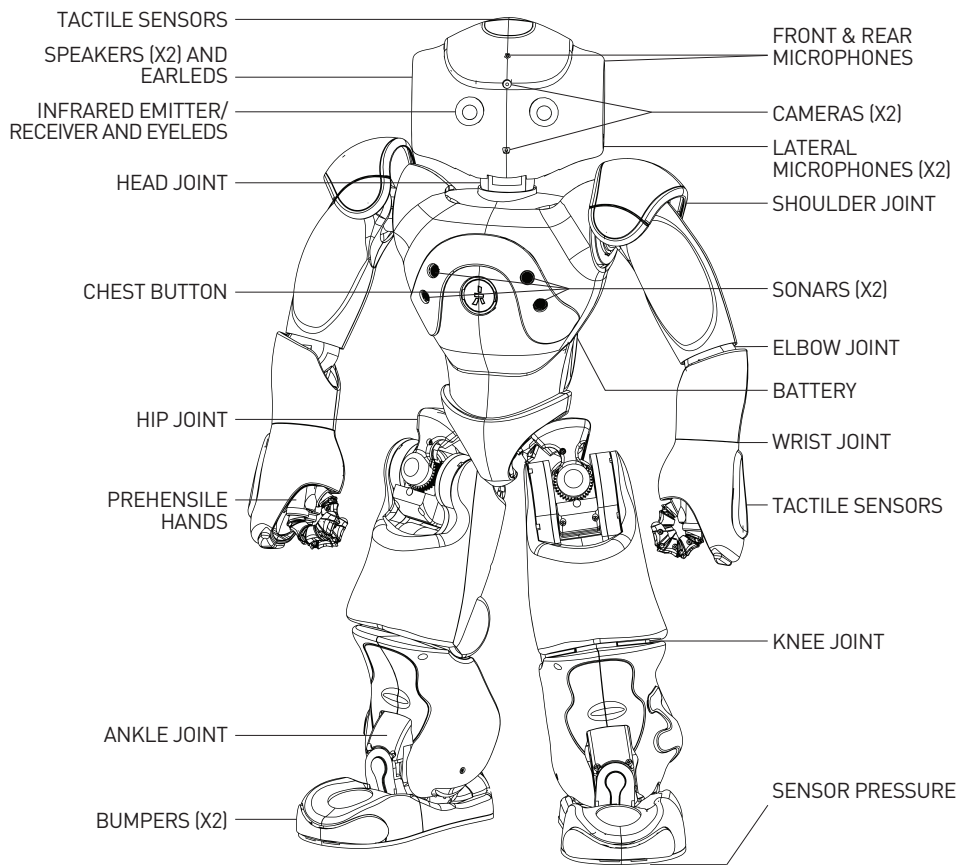
- 1 **NAO**
- 1 **DOCUMENTATION + SOFTWARE DVD**
- 1 **BATTERY**
- 1 **STANDARD CHARGER**
- 2 **SCREWS**
- 1 **ADAPTOR**
- 1 **USER GUIDE**

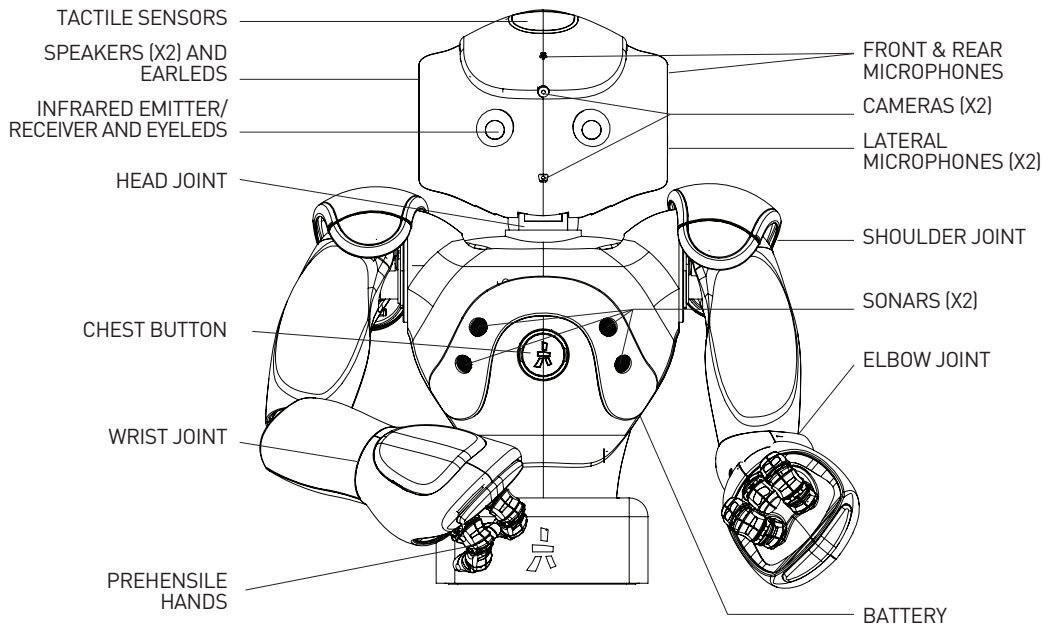
WHAT YOU NEED TO USE YOUR NAO

- 1 **ETHERNET CABLE**
- 1 **ROUTER WITH WIFI CONNECTION**
- 1 **COMPUTER WITH WINDOWS, MAC, OR LINUX**

You can also find information on:
<http://users.aldebaran-robotics.com>

NAO OVERVIEW



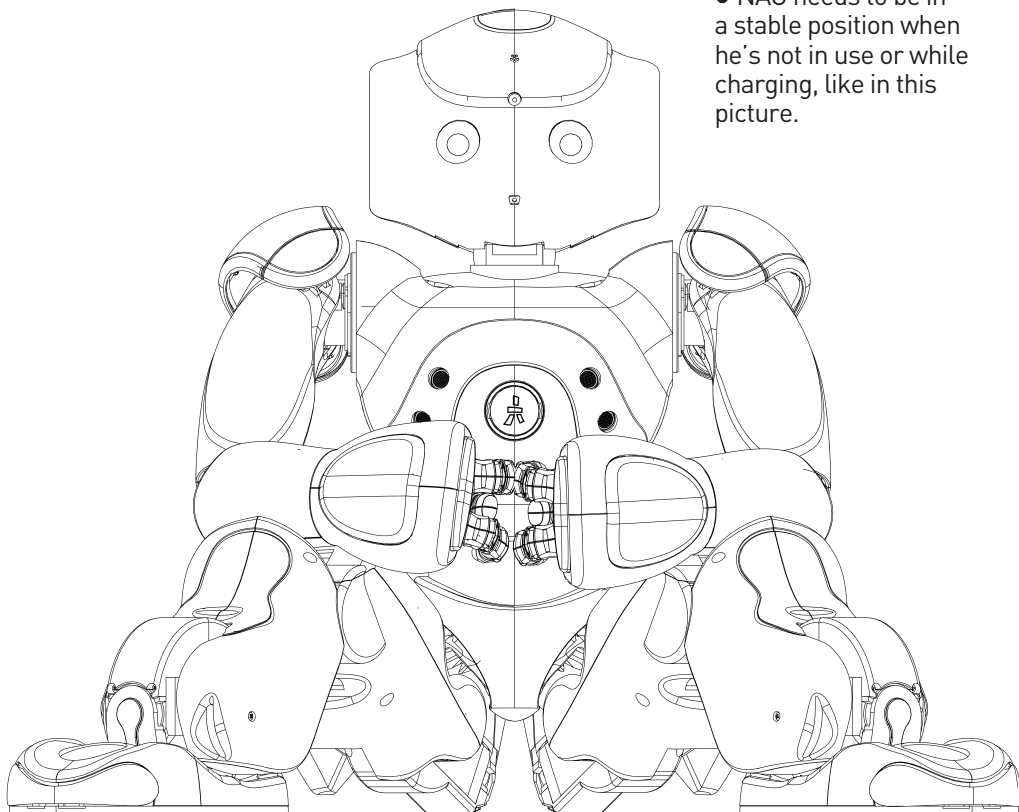


NAOTOR50

BEST PRACTICES

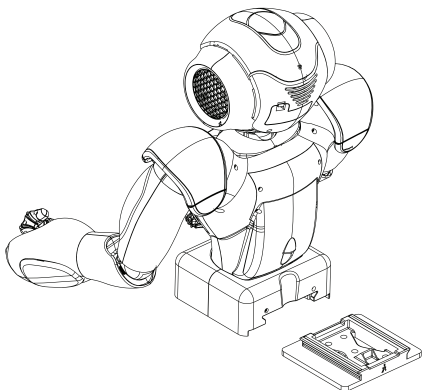
NAOHUMANOID

- NAO needs to be in a stable position when he's not in use or while charging, like in this picture.



NAO^{TORSO}

- Fix NAO's base onto a horizontal surface with 4 screws.



ETHERNET CABLE

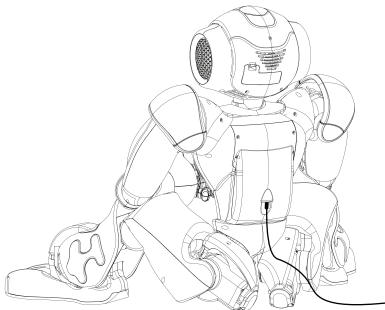
- When plugged into Ethernet, NAO should not walk, lie down or perform behaviors which could move his head too far (particularly tilting his head back), as the plug could damage his head. The Wifi connection is the recommended connection.

HANDS

- Avoid playing with NAO's fingers and rotating his hands when turned off.

CHARGING NAO

- 01.** Ensure that your NAO is secured in a stable position
- 02.** Plug the adaptor into the connector located in the back of NAO. Make sure that the plug is fully inserted.
- 03.** Check the charger's LED. For further information, check the charger documentation.
- 04.** Let NAO charge for at least 2 hours. A solid Green LED should appear on the charger to notify that NAO is fully charged.



CLEANING

- Use a damp cloth to clean NAO.

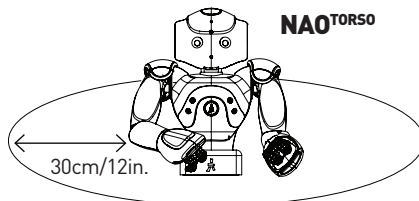
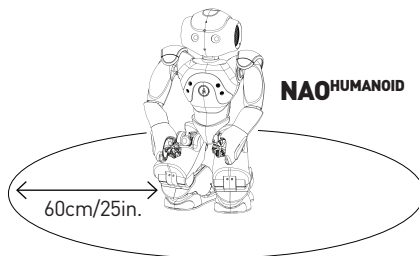
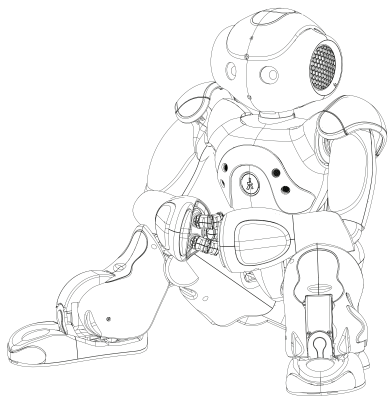
SAFE AREA

You should prevent NAO from falling. Yet if NAO falls, NAO should not hurt any object or fall from a high surface, such as a table.

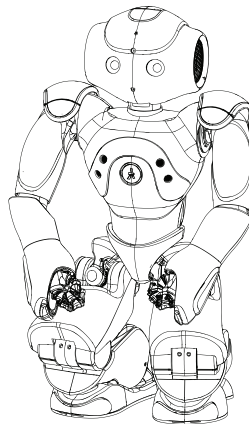
A safe working area is shown in the figures opposite.

The way you position NAO is also important to prevent NAO from falling or hurting himself. Place him in a stable position when pressing his Chest button, or when plugging a cable. Before starting a move, make sure NAO can perform it from his current position.

When turned off, the best position is to have NAO lying down on his back, with no cable plugged.



We recommend that NAO adopts these positions while working.



UNDERSTANDING NAO'S MESSAGES

NAO communicates with you when he is getting too hot or when his battery level is too low so that you can take care of him. This is normal.

- **When NAO says:**

“Battery Low” : The battery is very low. NAO is about to turn off and may fall.

“Motor Hot” : The motor of a joint is getting too hot. The joint will become less stiff as a protection and NAO may fall as a result.

“Head Processor Hot” with its eyes blinking.

The CPU in the head is getting too hot. You should turn NAO off as its behavior could be unexpected and if the temperature keeps increasing, it will turn off automatically.

“Head Processor overheating, Shutdown” with its eyes blinking. The CPU in the head is getting too hot, NAO is about to turn off automatically and may fall.

“I can’t find my battery” :

There could be an issue with the battery or with the communication with the battery. Contact the support.

“I can’t find my body”:

There is an issue in the communication between the head and the body. Contact the support

- **Color of the chest button and level of battery:**

- **GREEN:** continuous green light means that the battery is fully charged.

- **ORANGE:** continuous orange light means that the battery charge is less than 60%

- **RED:** slow red blinking light means that the battery charge is less than 20%. Better charge your NAO.

NOTE: When you press the chest button, it also turns green.

- **Boot-up**

While NAO boots up, the LEDs in the eyes turn from Red to Blue to Green . You will see the boot progression on the ears LEDs. The boot is finished when the ears are fully blue.

TEMPERATURE OF THE MOTORS/HEAD

When NAO says “**Motor Hot**” it means that one of his joint motors is too hot. Pressing the chest button makes NAO indicate which joint is hot.

Once the motor has become hot, it is still possible to use NAO. The only consequence is that the stiffness of the motor will be slowly decreased. This could make NAO fall down if the stiffness is too low.

NAO enters a self-protection mode and starts to limit stiffness. Consequently moves which require the motor’s full power might be disturbed. For instance: if your NAO is sitting down and you ask him to stand up NAO might have trouble achieving this task and fall.

When you write behaviors we recommend that you:

- Make NAO move and do not let him stay in the same position for too long when the stiffness on.
- Plan breaks during which NAO can sit down and remove stiffness to rest for a while.

A sample box sequence in Choregraphe:
“**sit down**” , “**remove stiffness**” , “**wait 10**

minutes” , “**turn stiffness back on**” , “**stand up**” (to resume a standing behavior).

STIFFNESS

What is “stiffness”?

To be able to move, NAO’s motorized joints need to be stiff. The “stiffness” of the motors is made possible thanks to power supply.

Stiffness and motor temperature

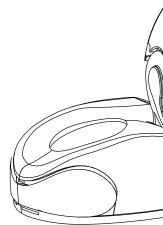
When the motors are stiff, their temperature increases.

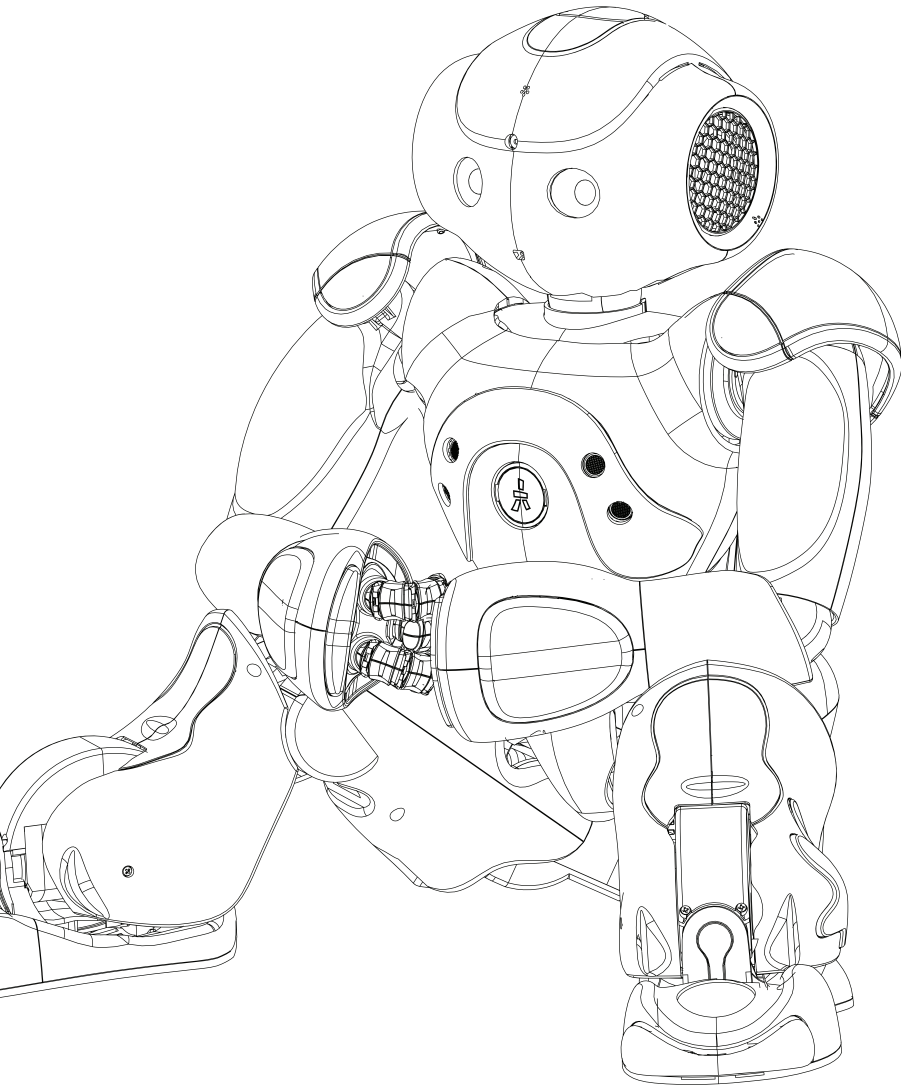
When you turn on your NAO, the motors do not become stiff. They become stiff when the stiffness is turned on during a behavior. For example, in Choregraphe, the Walk box turns on the stiffness.

Quickly releasing the stiffness

To remove stiffness on all joints, press twice on the Chest button. (NAO may fall so make sure you support him!)

FIRST STEP





01. Remove NAO from his box and place him in a stable position.

02. Charge NAO: plug the charger into his back before use.

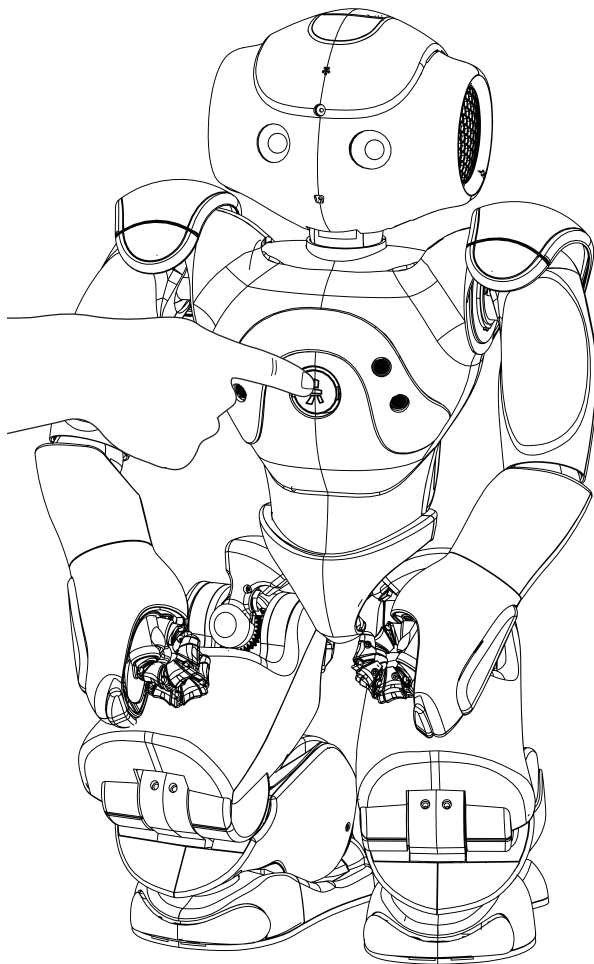
TURNING YOUR NAO ON AND OFF

To turn NAO on,
press his chest button:
NAO will boot up.

To turn NAO off,
press and hold his chest
button for 5 seconds.

NAO may fall so make sure
NAO is in a safe position.

To force NAO to perform
an emergency shut down
(not recommended in nor-
mal use) press and hold
his chest button for
8 seconds.



CONNECTING TO NAO

ETHERNET CONNECTION

- 01.** Turn on your NAO.
- 02.** Remove the hatch behind his head to access to the Ethernet socket.
- 03.** Connect NAO to your router via an Ethernet cable.
- 04.** Get his IP address: press his Chest button. He says his IP address (e.g. "192.168.1.4").
- 05.** Open an Internet browser (such as Internet Explorer, Firefox, etc).
- 06.** Type the IP address which NAO has just spoken into the address bar and press Enter.
- 07.** NAO's webpage opens. Type in the default login and password: "nao" for both.
- 08.** Explore the page (change the name, volume...).

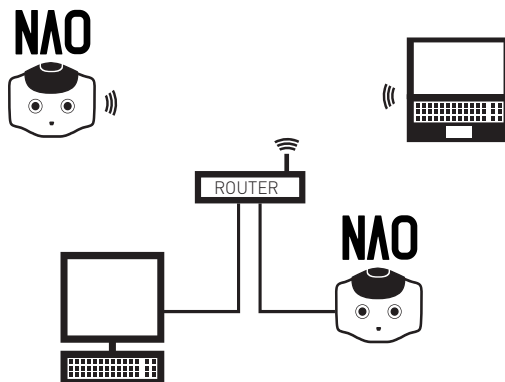
WIFI CONNECTION

- 01.** To set Wifi connection on the webpage, connect NAO via Ethernet.
- 02.** On the webpage of NAO, go to **Network**.
- 03.** In the list of available networks, click the one you want to use.
- 04.** Its configuration page opens. Click **Connect**. NAO will connect automatically when finding this network.

NETWORK PARAMETERS

The router should act as a DHCP server.
Wireless connection parameters:
WEP, WPA or WPA2 Personal

Note : we recommend you use the Wifi connection when working with NAO.



INSTALLING THE SOFTWARE



CHOREGRAPHE

Our user-friendly software Choregraphe enables you to program easily for NAO. With Choregraphe and its flow diagram, you can explore event-based, sequential or parallel programming using a pre-programmed set of behavior boxes. Its timeline lets users program with a time scheduled logic. It accepts Python script, so it can call C++ modules developed separately. Choregraphe comes with many detailed examples to simplify the learning process.



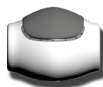
Webots for NAO

Our simulator Webots for NAO enables you to test their algorithms in a virtual world governed by real physics. The environment can be modified manually at will by inserting and editing objects of various shapes into the simulated environment.



MONITOR

Monitor is a desktop application that gives you a feedback of what NAO is seeing and feeling. With the Camera module, you will receive data from the camera you have chosen. With the Memory module, you will have access to data from NAO's sensors in an ergonomic way. Monitor also gives you the possibility to test vision algorithms on recorded excerpts.



NAOqi

Our ergonomic and well documented SDK enables you to embed modules you have created onto your NAO and to use them to create elaborate behaviors for NAO. The SDK for NAO comes with the appropriate compilation and debugging tools.

INSTALLATION FOR WINDOWS



Software, SDK and full documentation delivered with NAO are available on the DVD home page.

Click on [index.html](#) if auto-run doesn't launch it automatically.

Choregraphe Suite

01. Make sure you have logged on as Administrator or as a user with Administrator privileges.

02. Retrieve the following file:
choregraphe-suite-x.x-win32-setup.exe
You can find it on the DVD in Software Suite→Choregraphe Suite then click on the windows icon, or download the latest release from the Aldebaran Robotics' User or Developer site.

03. Double-click the file to start the installation.
Additionally to Choregraphe, if it is not yet installed on your computer, the wizard may suggest to install Bonjour, a tool conceived by Apple.

04. Accept all and follow the wizard steps.

SDK

Find requirements and installation guidelines in the Programming section from the documentation.

INSTALLATION FOR LINUX



Software, SDK and full documentation delivered with NAO are available on the DVD home page.

Click on [index.html](#) if auto-run doesn't launch it automatically.

Choregraphe Suite

01. Make sure you have logged on as root or use sudo.

02. Retrieve the following file:
choregraphe-suite-x.x-linux32.tar.gz
You can find it on the DVD in Software Suite→Choregraphe Suite then click on the Linux icon, or download the latest release from the Aldebaran Robotics' User or Developer site.

03. Extract the archive.

SDK

Find requirements and installation guidelines in the Programming section from the documentation.

INSTALLATION FOR MAC



Software, SDK and full documentation delivered with NAO are available on the DVD home page.

Click on [index.html](#) if auto-run doesn't launch it automatically.

Choregraphe Suite

01. Make sure you have logged on as Administrator or as a user with Administrator privileges.

02. Retrieve the following file:
`choregraphe-suite-x.x-mac32.dmg`
You can find it on the DVD in Software Suite→Choregraphe Suite then click on the Mac icon, or download the latest release from the Aldebaran Robotics' User or Developer site.

03. Open the file.

04. Drag and drop the Choregraphe and Monitor applications into the Applications directory.

SDK

Find requirements and installation guidelines in the Programming section from the documentation.

TROUBLESHOOTING

GENERAL

My NAO does not start, or starts but does not finish booting.

01. Charge the battery for at least 2 hours. Then, press the Chest button again to turn it on.

02. Update your NAO (in Choregraphe, with your NAO connected, go to Connection → Advanced → Flash your NAO).

03. Try the factory reset procedure. Find more info in the “Update” session of the Documentation.

If it still does not start, contact the support team.

I can't turn my NAO off.

You should place NAO in a stable position and hold down his chest button for 8 seconds to force shutdown.

CONNECTION

NAO says that he can't connect to the network.

01. Connect NAO via Ethernet (make sure the Ethernet cable is correctly plugged into NAO and to the router).

02. Make sure your network is configured in DHCP as described earlier in this guide.

03. Turn NAO off.

04. Turn NAO on.

05. Go to NAO's webpage and connect to one of the available Wifi connections.

NAO should now be connected to the network. Check in NAO webpage → network if there is a Mac address available for the wireless connection.

If NAO still says «I can't connect to the network», contact support.

I don't know the IP address of my NAO. What should I do?

Press his Chest button 1 second. NAO says his IP address and the charge level of the battery.

HARDWARE

If I unplug NAO after full charge and immediately plug it again, the charger's LED goes red or orange again.

This is normal. As soon as you unplug the battery, it starts to slowly discharge. The charger is accurate enough to detect this situation and will launch a new charging cycle.

My charger refuses to charge my battery.

This situation appears if the battery is too hot. Internal safeties are triggered if the battery raises above 50°C. If this occurs, let the battery cool down for 20 minutes and retry.

CHOREGRAPHE

When I play a behavior, some boxes turn red. What's the problem?

It occurs when you play a behavior made of boxes which cannot be simulated on a virtual NAO (called «**local NaoQi**»)

01. Connect Choregraphe to NAO.

02. Play the behavior on the physical NAO itself.

REMOVING NAO'S HEAD

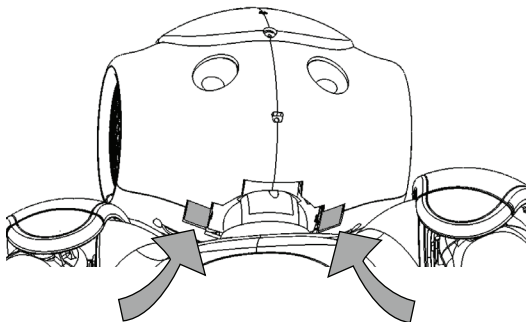
You will need to do this if your NAO does not turn on, if you want to change the head, or if asked to do so by Support.

01. With NAO turned off and unplugged, firmly grip his head on either side of his face.

02. Push up on the two buttons located on the underside of NAO's head as shown, making sure they are fully pressed in.

03. The head should lift off.

04. To replace NAO's head, simply align the connector on his neck with the body and push down. You should make sure that the head fully 'clicks' in; both buttons should snap back into place.



If your problem is still not solved, please contact support via :
<http://users.aldebaran-robotics.com>

**FINDING OUT
MORE ABOUT US**

The NAO Community should be your first port of call for support and information:
<http://users.aldebaran-robotics.com>

Read the documentation.
It can be found on the DVD, on the forum and with the software.

Contact support:
<http://users.aldebaran-robotics.com>

**For information about ALDEBARAN Robotics, visit our website at
www.aldebaran-robotics.com**

NOTES



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